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PROBLEMS FOR SOLUTION.

ALGEBRA.

253. Proposed by **R. D. CARMICHAEL,** Hartselle, Ala.

Prove that $x^5+ax+b=0$ is solvable by radicals if $b=ma$, m being the negative of half the sum of any two roots of the original equation. Exhibit the solution.

254. Proposed by **R. D. CARMICHAEL,** Hartselle, Ala.

Sum to infinity the series $\dfrac{n^2}{(16n^2-1)^2}$ beginning with $n=1$.

255. Proposed by **O. E. GLENN, Ph. D.,** Springfield, Mo.

Let f be the binary cubic $a_0x_1^3+3a_1x_1^2x_2+3a_2x_1x_1^2+a_3x_2^3$, $\triangle=(f,f)_2$ the covariant, the second transvectant of f over itself, and $R=2[4(a_0a_2-a_1^2)\times(a_1a_3-a_2^2)-(a_0a_3-a_1a_2)^2]=(\triangle,\triangle)_2=$the second transvectant of $\triangle$ over itself. Then if $\triangle_{\kappa\lambda}$ is the $\triangle$ covariant for the cubic pencil $\kappa f+\lambda Q$, Q being the first transvectant of f over $\triangle$ we have $\triangle_{\kappa\lambda}=(\kappa^2-\frac{1}{2}\lambda^2R)\triangle$.

CALCULUS.

900. Proposed by **PROFESSOR B. F. FINKEL, A. M.,** 4038 Locust Street, Philadelphia, Pa.

Prove that, if the differential equation $cydx-(y+a+bx)dy-nx(xdy-ydx)=0$, be transformed into an equation between u and x by the substitution $u(y+a+bx+nx^2)=y(c+nx)$, then the variables are separable; and reduce the equation to the form $dv/\phi(v)=dx/\phi(x)$ by the further substitution $v=\alpha u+\beta$, α and β being suitably determined. *Euler.* [Forsyth's *Differential Equations*, p. 48, Ex. 4.]

DIOPHANTINE ANALYSIS.

132. Proposed by **O. E. GLENN, Ph. D.,** Springfield, Mo.

Disregarding the order of λ, μ, ν, how many sets of solutions has the congruence $\lambda+\mu+\nu\equiv0 \pmod{p-1}$ (p prime)?

GEOMETRY.

280. Proposed by **WILLIAM HOOVER, Ph. D.,** Athens, Ohio.

On any diameter of a given ellipse is taken a point such that the tangents from it intercept on the tangent at one end of the diameter a length equal to the diameter; the ellipse being $a^2y^2+b^2x^2-a^2b^2=0$. Prove that the locus of the point is $\left(\dfrac{x^2}{a^2}-\dfrac{y^2}{b^2}\right)^2=\left(\dfrac{a^2+b^2}{a^2-b^2}\right)^2\left(\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}\right)$.